



Volume: 04 Issue: 04 | 2023 ISSN: 2660-454X

<https://cajitmf.centralasianstudies.org>

Industries with Green Growth Potential: Green Building

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Received 16th Feb 2023,

Accepted 19th Mar 2023,

Online 14th Apr 2023

Abstract: The growth trends of «ecoconstruction» in Uzbekistan, energy efficiency and certification in building construction, carbon dioxide absorption in concrete, and supplying facilities with eco-friendly materials have all been addressed, and suitable solutions have been developed.

Key words: economy, «ecoconstruction», eco-friendly, concrete.

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Introduction. The trend of sustainable development of “green building” continues in the world, while there are several terms denoting almost the same process: green building, green building, eco-development, “green” building - a type of construction and operation of buildings, whose impact on the environment is comparatively minimized. The concept of "green" construction is based on the idea of rational use of energy and material resources in construction, which implies the efficient distribution of resources for water supply and sewerage, heating and ventilation, power supply, saving building and finishing materials [1].

Advanced international experience. The status of a "green" building or structure is assigned to an object after appropriate preparation and passing a special certification procedure. At the moment, the main international voluntary green building standards are BREEAM (Building Research Establishment Environmental Assessment Method), developed in the UK in 1990, and LEED (Leadership in Energy and Environmental Design), developed in the USA in 1993.

The German Sustainable Building Council (DGNB) has developed new standards that analyze the sustainability of a building in the long term, taking into account its functionality over the next 50 years. DGNB quickly gained popularity, thanks to its flexibility, it successfully adapts to the legal requirements of almost any country.

Many countries are developing national standards that would satisfy not only natural, but also socio-economic conditions within the country, for example: "Green Mark" in Singapore, "Casbee" in Japan, "HQE" in France.

In Kazakhstan, measures were taken to develop their own "green" certificate. Initiative market participants united in the non-profit organization KazGBC, which became part of the global World Green Building Council (WorldGBC). With the support of international experts, KazGBC has developed a domestic system of environmental assessment "Omira" ("Life"). According to it, by 2020 it was planned to certify 200 buildings and train a thousand specialists in green building. Four buildings have received pilot certificates by 2021 [2].

According to Knight Frank, in 2020 there are 177 green-certified buildings in Russia, with more than 74% of them assessed under the BREEAM scheme. As a rule, in the Russian market, offices are built according to "green" standards – almost half of the objects (46%). Next come retail (24%) and warehouse real estate (15%). At the end of 2020, Knight Frank estimated that more than 120,000 buildings were certified to green standards around the world. The leaders are Abu Dhabi (22.4 thousand buildings), Chicago (4.4 thousand) and London (3 thousand) [3].

Uzbekistan Trends. In recent years, efforts in the republic have also been stepped up to adopt and build a "environmental" economy, notably in the construction industry. The "Strategy for the Transition of the Republic of Uzbekistan to a "Green" Economy for the Period 2019-2030" [4] was approved, with the goal of improving the energy efficiency of the basic sectors of the economy, diversifying energy consumption and developing the use of renewable energy sources, adapting and mitigating climate change, increasing the efficiency of natural resource use and preserving natural ecosystems, developing financial and non-financial mechanisms, and developing financial and non-financial mechanisms

The Center for Economic Research and Reform previously implemented a research project "Green Buildings in Uzbekistan: Technologies, Regulations and Incentives", which describes the most important aspects of the transition to a green economy in the construction sector, including the use of technology, the development of standards and effective incentives to improve the energy efficiency of buildings. The potential for savings from the implementation of green building measures in Uzbekistan is estimated at about 8 million toe, the estimated losses due to the lack of "greening" of buildings exceed 2.1 billion US dollars. At the same time, the total annual costs required to implement the principles of "green" construction are significantly less than the expected benefits [5].

The importance of introducing the principles of "green" construction is also confirmed by the prospects for creating productive employment in this sector (up to 120,000 additional jobs by 2030). In addition, significant benefits can be obtained by establishing and expanding the production of appropriate materials and equipment, developing related industries and creating additional jobs [5].

In Uzbekistan, all housing construction facilities are required to be equipped with energy efficient and energy saving equipment at the stage of design and survey and construction and installation works, and must also receive an energy audit passport before they are accepted for operation, with the exception of objects that have a certificate according to the international standards BREEAM (method of environmental assessment of the effectiveness of buildings) and LEED (guidelines for energy efficient and environmental design), which will ensure energy saving and reduce greenhouse gas emissions [6].

In 2021, about 30 thousand energy efficient apartments were built and put into operation in Uzbekistan, in 2022 it is planned to increase the construction of such apartments by 20%. An energy efficient and low carbon apartment building is a building with low consumption of heat and electricity due to the economical use of energy resources during operation [7].

Losses of useful energy in buildings and structures range, according to various estimates, from 20% to 45%, while through walls - up to 22%, windows - up to 14%, floors and ceilings - up to 8%. Completed "green" projects have shown the possibility of saving energy for heat supply of buildings up to 25-30% in comparison with the basic indicators [8].

The largest consumers of electricity in a building are heating, ventilation and air conditioning systems, household appliances. With a competent design approach, the introduction of modern technologies, the use of inverters, and other innovative achievements, the operating costs of these systems can be reduced by 30–60% compared to conventional approaches [9].

Cold water savings come from the installation of automated plumbing and household appliances with low water consumption, as well as wastewater treatment, rainwater collection and use, and individual conservation measures.

In "eco-construction", the main volumes of new construction, reconstruction and repair and construction activities appear in directions and at facilities that are within the power of small business structures that have higher mobility and maneuverability, efficiency in fulfilling orders for due to the opportunities to quickly combine a significant number of specialists into interconnected working groups, which leads to the creation of a significant number of "environmental" jobs, mainly in small businesses.

When designing and developing "green" construction, it is necessary to keep in mind the relatively high cost of "green" projects, since the latest engineering systems and special materials are used in the construction of environmentally friendly structures and buildings, which leads to an increase in the cost of construction, including housing in by an average of 10%, lengthens the payback period for capital investments [10].

Reduction of harmful impact on the natural environment. The introduction of environmental technologies in construction is aimed at optimizing the use of energy, minerals and reducing the harmful impact on the natural environment. From this point of view, the compliance of universal and widely used types of building materials - cement and concrete with the requirements of "eco-construction" is considered. Concrete products are easy to operate, have a long service life, good noise insulation, are widely used in construction when building the foundation of buildings - the foundation, making architectural structures, ceilings, panels, pouring the floor, blind area and in other areas.

The ability of concrete to absorb greenhouse gases. An international team of researchers led by Professor Dabo Guan (University of East Anglia, has a specialized School of Environmental Sciences) found that during the natural process of carbonation of cement and materials based on it, carbon dioxide is absorbed from the air in volumes that must be taken into account when analyzing the impact on the environment. The scientists analyzed long-term data collected in China, as well as already available results of studies of cement and concrete throughout the entire life cycle, including recycling, and modeled the regional and global uptake of atmospheric carbon dioxide by all these materials between 1930 and 2013. During the specified time period, the objects, during the construction of which materials and products made of cement were used, calculated absorbed about 4.5 gigatonnes of carbon or, in terms of carbon dioxide, 16 gigatonnes, which compensates for about 43% of carbon dioxide emissions during their production [11].

Scientists from the Department of Civil Engineering at Purdue University (USA) have found that the addition of nanosized titanium dioxide, used in creams, paints, plastics, and food preservatives, to the concrete mixture almost doubles the natural ability of concrete to bind carbon dioxide [12]. Taking into

account the clear positive environmental effect, the results of these studies show the feasibility of continuing the use of cement and materials based on it in the long term, including in housing and road construction (instead of asphalt pavement).

The main components of cement concrete roads - cement and solid non-metallic building materials (gravel, crushed stone, sand and stones) are produced in almost all regions of Uzbekistan, which will help reduce greenhouse gas emissions associated with the transportation of materials from the manufacturer to the construction site. Therefore, among the priority areas for the development of the industry in the country, it is envisaged a phased implementation of the transfer of newly built and reconstructed roads to cement concrete pavement, as well as the implementation of a program for the repair and restoration of road bridges and flyovers.

In the construction of housing and roads, which are the most important sectors of the economy, the multiplier effect of the development of "eco-construction" is noticeably manifested, with the consumption of products from many related industries, as well as the creation of a large number of additional jobs, including in remote areas. At the same time, the funds invested in the organization of one job in construction create the prerequisites for the establishment of up to six new ones in related industries.

This is connected with the emergence of not only primary, but also secondary and tertiary employment. Thus, the initial investment expenditures of budgetary or other funds lead to the multiplication of employment and the purchasing power of the population [13].

At the same time, the territorial authorities need to systematically take measures for the further development of intra-quarter and roadside services of all types:

- objects of trade in food and industrial goods, operational services, educational and health facilities, guarded parking lots, markets, catering facilities (teahouses, cafes, restaurants), etc.;
- public transport stops, pedestrian crossings, passenger bus stations and bus stations;
- motels, campsites and hotels of various types, sites for short-term recreation,
- filling stations, service stations,
- tire and other workshops, auto parts stores, mechanized washing stations and spontaneous washes.

The development of these integration systems aimed at further improving the well-being of the population, combining interconnected chains of structures of various types and purposes, branched networks of information support and maintenance of residential areas, social infrastructure facilities, road,

road transport, other supporting and coordinating structures, including small businesses, providing users with high quality comprehensive services on a large scale.

When creating and putting into operation such systems, the use of the "human factor" will be an important component. Involvement in the systems of this type of small businesses, family businesses, self-employment and homework at a relatively low cost of funds will increase efficiency and accountability for results, improve the welfare of the population and reduce poverty.

The transition to "eco-standards" and "green" construction should be accompanied by the implementation of a set of various measures:

- increasing the economic attractiveness of "green" construction for investors and contractors. At the same time, it is advisable to use effective mechanisms and tools used by developed countries: ensuring the implementation of "green" projects and environmentally friendly energy systems with

concessional financing and subsidies through various government programs and funds, providing various preferences;

- conducting an active and long-term propaganda campaign in support of the development of "eco-construction" in Uzbekistan, raising awareness of the population and legal entities about the importance and benefits of this area, so that environmental standards become understandable and favorably perceived;
- creation and wide application of an appropriate regulatory and legal framework of direct action for the construction and operation of "green" buildings and structures;
- wide dissemination at the first stage of certification of buildings according to minimum environmental standards, which will give impetus to the development and implementation of "green" technologies in the republic;
- stimulating and supporting the creation of new jobs, including "green" ones in all regions of Uzbekistan;
- conducting joint research with the relevant structures of the Central Asian countries in the field of further reduction of carbon emissions, solving climate issues in the region, exchanging and implementing best practices in the development of production and the use of renewable energy, as well as "eco-construction";
- attracting analytical centers from different countries to participate in joint scientific events - conferences, forums, research, including grants.

The introduction of the principles of "green" construction attracts the attention of the world community, influences the development of a positive image of the country, helps to increase its level in various international indices, including credit ratings.

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